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REMARKS

The non-elected claims have been cancelled without prejudice to applicants' right to file an appropriate continuing application directed thereto.

Claims 1-8 and 10-18 were rejected under 35 U.S.C. §§ 102 or 103 over Hessel. This rejection is respectfully traversed.

Ceramic slurries containing a ceramic material, water and a water-soluble acrylic binder have been proposed recently. However, the water soluble acrylic binders used have a high solution viscosity and the slurry formed using such a binder also has a high viscosity. As a result, the slurry has lower flow characteristic as well as a degraded dispersion characteristic for the ceramic raw material powder, which make it difficult to obtain uniform ceramic green sheets. Attempts to decrease the slurry viscosity by either increasing the amount of the aqueous solvent or decreasing the molecular weight of the binder have been proposed. Increasing the amount of aqueous solvent, however, results in the drying characteristics being degraded which in turn results in the generation of cracks in the multilayer ceramic parts eventually made. Changing the molecular weight also changes the mechanical properties of the ceramic green sheets such that their tensile strength and elongation rate are decreased. The present invention has been designed to overcome these deficiencies and provides a composition which has these advantages.

The independent claim under examination calls for a ceramic slurry composition containing a ceramic raw material powder, an aqueous solvent and a water-soluble acrylic binder which has a weight average molecular weight of from about 10,000 to 500,000 and an inertial square radius of not more than about 100 nm in the aqueous solvent. Hessel does not teach or suggest such a slurry composition.

The Hessel reference teaches a composition which is a combination of a ceramic powder, binder and dispersing agent. The dispersing agent is essentially water and the binder is an emulsion copolymer of a (meth)acrylic ester and an unsaturated carboxylic acid in the form of microbeads, i.e., a solid. Hessel does not teach or suggest use of a water-soluble acrylic binder which has a weight average molecular weight of from about 10,000 to 500,000 and an inertial square radius of not more than about 100 nm in the aqueous solvent.

The first Office Action in this case asserted that the acrylic polymers of the Hessel examples “inherently possess the instant weight average molecular weight”. Applicants traversed this assertion pointing out that the PTO had no right to rely on an assertion of inherency unless inherency is certain. In that connection, the Examiner’s attention is respectfully invited to *In re Roberson*, 49 USPQ2d 1949, 1949-50 (Fed. Cir. 1999) and *Ex parte Cyba*, 155 USPQ 756 (Bd. App. 1966). The Examiner has responded by indicating that a mere assertion that acrylic emulsion polymers frequently have molecular weight of 1,000,000 or more has little probative value. To support applicants’ statement, there is attached hereto a copy of a polymer text showing that emulsion polymerization of ethyl acrylate had a degree of polymerization of 14,000. Since the molecular weight of ethyl acrylate monomer is 100, the molecular weight of the polymer is 1,410,000. This is far above the 500,000 recited in the instant claims. This means that the inherency is not certain and the PTO cannot rely on inherency when advancing Hessel as a reference.

The current Office Action states that the co-polymers of Hessel may encompass “any” molecular weight since the reference does not specify molecular weight but instead has viscosity measurement in such examples. Reliance on a failure to specify molecular weight is improper since it relies on silence in the reference, *In re Newell*, 13 USPQ3d 1248, 1250 (Fed. Cir. 1989). There is nothing apparent on the face of Hessel’s German text which refers to viscosity in the examples of that reference nor does the Office Action make reference to any particular passage. Viscosity measurements are usually given in poise

(or centipoises), pascal seconds, $\text{m}^2/\text{seconds}$ or stokes, yet no values setting forth such measurement values appear to be set forth in reference.

The Office Action also avers that the Applicant failed to show that the examples of Hessel do not yield the instant molecular weight. It is respectfully pointed out, that until, and unless, the PTO provides a *prima facie* basis for rejection, there is no burden upon the Applicants to disapprove anything. As there is no proper basis to rely on inherency or basis to even begin to speculate about the molecular weight in Hessel's examples, it is respectfully submitted that no *prima facie* basis for rejection is present.

The Office Action disagrees with Applicants' assertion that the copolymer of Hessel is not water soluble since it is in the form of microbeads because Hassle's copolymers "comprises the same monomers at amounts thereof as the instant invention." This assertion is apparently based on the possibility the reference includes the same copolymers based on the scope of the generic disclosure, i.e., the monomers used to the make the copolymers may possibly overlap and if the appropriate selection is made (without any guidance or motivation), the amounts selected may possibly overlap. It is respectfully submitted that a generic shotgun disclosure cannot suffice to support this speculative contention. A generic disclosure does not disclose (anticipate) any particular species not actually set forth in the reference, *Corning Glass Works, v. Sumitomo Electric U.S.A. Inc.*, 9 USPQ2d 1962, 1970 (Fed. Cir. 1989). Moreover, since Hessel intends to make a solid (the microbead), those skilled in the art would select monomers and amounts of reactants to realize that result. Hence, the copolymers in Hessel would be expected to be water insoluble.

The Office Action notes that no particular value of water solubility is recited while instant claim 3 recites up to the use of 99% weight of a hydrophobic monomer. The lack of a quantative recitation of water solubility is not relevant since Hessel does not suggest any degree of water solubility. Further, the term "water soluble" is being expressed to one of ordinary skill in the art and a person of ordinary skill in art would not consider a solid microbead which can be dispersed in water to be water soluble.

Additionally, the assumption that a monomer must be hydrophobic if the homopolymer is not water soluble is too general to be accurate. Indeed, the precipitation of an insoluble polymer of hydrophilic monomers in water as it is formed is the basis of precipitation polymerization. In any event, it is the nature of the polymer, not the monomer, that is specified in the claims.

Beyond all of the foregoing, Applicants previously pointed to the terminology “inertial square radius” used in the claims which represents a size of a molecule in aqueous solution and thus indicates that extent of spreading when a polymer is dissolved in an aqueous solvent. Since the claim designates the extent of spreading when the polymer (binder) when dissolved in aqueous solvent, the claims indicate that the acrylic binder dissolves in the aqueous solvent. The assertion that the meaning of “water soluble” in the instant claims does not refer to a solution is therefore not valid.

When all of the foregoing is taken into consideration, Hessel teaches a casting composition which contains ceramic powder, an emulsion copolymer in form of insoluble microbeads (which do not dissolve in the aqueous solvent) and water. In contrast, the present claims call for a ceramic slurry comprising a ceramic raw material powder, a water soluble acrylic binder having a particular molecular weight and a particular inertial square radius and an aqueous solvent. The claimed composition and the material disclosed by Hessel are different. Nothing in Hessel suggests what changes must be made to realize the instantly claimed composition nor motivates one to make such changes. No rejection based on Section 102 or 103 is appropriate.

The claims were also rejected under 35 U.S.C. § 103 over Hessel in view of Miyazaki and either Sambrook or Masaki. Masaki has been cited only to show an acrylic copolymer having a number average molecular weight of 5,000 to 300,000. However, number average molecular weight is different from weight average molecular weight and even if the two terms were synonymous, which they are not, Masaki only teaches that acrylic copolymers having a given molecular weight exist but that does not exclude the fact that acrylic copolymers having molecular weights far outside the instant claims also exist.

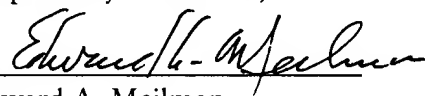
Sambrook and Miyazaki have been cited only to show that the water solubility of an acrylic polymer can be increased by the use of the salt form and this, at best, means that if one desired to do so, an acrylic polymer could be made soluble.

The additional references merely show that if motivated to make changes in Hessel's composition, certain parameters, among others, could be changed. Regardless of these theoretical possibilities, there is no motivated to make such changes in Hessel's composition. Accordingly, the combination of references do not render the claims obvious and withdrawal of the rejection is respectfully requested.

In light of the foregoing, it is respectfully submitted that this Application is now in condition to be allowed and the early issuance of a Notice of Allowance is respectfully solicited.

Dated: February 13, 2004

Respectfully submitted,

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Shin Kobunshi Jikkengaku 2
(New Experimental Techniques on Polymers)

Kobunshi no Gosei/Hannou (1)
(Polymer Synthesis and Reaction (1))

Fukakei Kobunshi no Gosei
(Synthesis of Addition Polymers)

Edited by the Society of Polymer Science, Japan

Kyoritsu Shuppan Co., Ltd.

[Experimental Example 1.1.26] Emulsion Polymerization of Ethyl acrylate⁷⁸⁾

Into a 300 ml four-necked flask with a stirrer, a reflux condenser, a thermometer, and a nitrogen inlet, 140 ml of water containing 111.3 mf of AIBA and 60 ml of ethyl acrylate were placed. Furthermore, 1.39 g of polyoxyethylene nonylphenyl ether (nonionic surfactant) and 1.39 g of laurylamine acetate (cationic surfactant) were added. After the air in the reaction vessel was thoroughly purged with nitrogen, the monomer was polymerized with stirring for 6 hours at 70°C. The emulsion was frozen to separate the polymer. The resulting polymer was subjected to dissolution and precipitation with an acetone-warm water system several times. After the polymer was dried at 70°C under reduced pressure, the intrinsic viscosity of the polymer was measured in benzene to determine the degree of polymerization. The degree of polymerization: 14,000.

新高分子実験学 2

高分子の合成・反応 (1)

付加系高分子の合成

高分子学会 編

*This page corresponds to page 1
of the translation.*

共立出版株式会社

annotated version

→ This paragraph corresponds to page 2 of the translation.

【実験例 1.1.26】 アクリル酸エチルの乳化重合⁷⁸⁾

攪拌機, 還流冷却器, 温度計および窒素導入口を有する 300 ml の四つ口フラスコに AIBA 111.3 mg を含む 140 ml の水と 60 ml のアクリル酸エチルを入れ, さらにポリオキシエチレンノニルフェニルエーテル (ノニオン性界面活性剤) 1.39 g とラウリルアミン酢酸塩 (カチオン性界面活性剤) 1.39 g を加える。反応器中の空気を十分窒素置換後, 攪拌しながら 70°C で 6 時間重合後, エマルジョンを凍結してポリマーを遊離させる。得られたポリマーはアセトン/温水系で溶解, 沈殿を数回繰り返して行なう。70°C で減圧乾燥後, ベンゼン中で極限粘度を測定し, 重合度を決定する。重合度 14,100。

【実験例 1.1.27】 酢酸ビニルの無触媒乳化重合⁷⁹⁾

磁気攪拌子を入れた 50 ml のパイレックス製重合管に 5 ml の酢酸ビニル, 10 ml の水, 0.5 ml のポリエチレンノニルフェニルエーテルソジウムサルフェートを仕込み, 真空装置を用いて凍結, 融解を繰り返し脱気後, 減圧下で封管し, 0°C に調節したパイレックス製の恒温槽中に固定する。攪拌子を回転しながら, 400 W の高圧水銀灯で 10 時間照射したあと, 多量の冷水中に重合物を析出させる。メタノールに溶解後, 水で再沈殿を繰り返し, 吸引濾過してポリマーを取り出し, 真空乾燥機で乾燥したのち秤量する。収率 82%, 重合度はアセトン中の極限粘度 (30°C) から次式を用いて決定できる。重合度 12,800。

$$\log \bar{P}_n = 3.31 + 1.61 \log [\eta]$$

1.1.5 反応規制

A. 重合速度の調整

ラジカル重合の速度 (R_p) は, 式 (1.1) に示したように, 理論的にはモノマー濃度の一次と開始剤濃度の 0.5 次 に比例する。この条件は, 開始剤濃度が大きすぎると, 開始剤の分解で生じた一次ラジカルが開始反応のみならず停止反応にも関与するようになるので, 理論式からずれる。 R_p は連鎖移動反応で調節が可能で, 連鎖移動で生じたラジカルの反応性が低いときには R_p は低下する。アリル化合物や 1-オレフィンが重合しないのは, モノマーへの連鎖移動反応が起こり, 生成したラジカルがアリル共鳴で安定し, 再開始反応に入らないためである⁷⁹⁾。

annotated version

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——付加系高分子の合成——



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